

CLAIMS

We claim:

1. A method of processing a received signal, comprising:
receiving the signal across a plurality of time slot intervals, respective ones of
the plurality of time slot intervals having a plurality of symbol positions associated
therewith to provide a sequence of symbols associated with the received signal in
5 respective ones of the plurality of symbol positions;
determining an average value across the plurality of time slot intervals for a
respective one of the plurality of symbol positions; and
determining whether the respective one of the plurality of symbol positions
contains a fixed symbol based on the average value determined for the respective one
10 of the plurality of symbol positions.
2. The method as recited in Claim 1, wherein determining whether the
respective one of the plurality of symbol positions contains a fixed symbol based on
the average value determined for the respective one of the plurality of symbol
positions comprises:
5 comparing the average value determined for the respective one of the plurality
of symbol positions with a symbol threshold value.
3. The method as recited in Claim 1, wherein determining an average
value across the plurality of time slot intervals for the respective one of the plurality of
symbol positions comprises:
determining average values across the plurality of time slot intervals for
5 respective ones of the plurality of symbol positions;
wherein determining whether the respective one of the plurality of symbol
positions contains a fixed symbol based on the average value determined for the
respective one of the plurality of symbol positions comprises:
determining whether the respective ones of the plurality of symbol positions
10 contain fixed symbols based on the average values determined for the respective ones
of the plurality of symbol positions; and
wherein the method further comprises:

determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence.

4. The method as recited in Claim 3, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions comprises:

- 5 comparing the average values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

5. The method as recited in Claim 3, wherein determining whether the received signal contains fixed symbols corresponding to the predefined symbol sequence comprises:

- 5 comparing the average values determined for the fixed symbols with the predefined symbol sequence to provide a correlation value; and
comparing the correlation value with a correlation threshold value.

6. The method as recited in Claim 1, wherein the average value is determined using an algorithm selected from the group consisting of a sample average algorithm, a moving average algorithm, an exponentially weighted average algorithm, and an exponentially weighted moving average algorithm.

7. The method as recited in Claim 1, further comprising:
associating each of the received symbols with a soft information value.

8. The method as recited in Claim 7, wherein determining an average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

- 5 determining an average soft information value across the plurality of time slot intervals for the respective one of the plurality of symbol positions.

9. The method as recited in Claim 8, wherein the average soft information value is determined using an algorithm selected from the group consisting of a sample

average algorithm, a moving average algorithm, an exponentially weighted average algorithm, and an exponentially weighted moving average algorithm.

10. The method as recited in Claim 8, wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

- 5 determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions.

11. The method as recited in Claim 10, wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions comprises:

- 5 comparing the average soft information value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

12. The method as recited in Claim 10, wherein determining the average soft information value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

- 5 determining average soft information values across the plurality of time slot intervals for respective ones of the plurality of symbol positions;

wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions comprises:

- 10 determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average soft information values determined for the respective ones of the plurality of symbol positions; and

wherein the method further comprises:

determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence.

13. The method as recited in Claim 12, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average soft information values determined for the respective ones of the plurality of symbol positions comprises:

- 5 comparing the average soft information values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

14. The method as recited in Claim 12, wherein determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence comprises:

- comparing the average soft information values determined for the fixed
5 symbols with the predefined symbol sequence to provide a correlation value; and
 comparing the correlation value with a correlation threshold value.

15. A method of processing a received signal, comprising:

- receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in
5 respective ones of the plurality of symbol positions;

 determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

- determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the average values determined for the respective
10 ones of the plurality of symbol positions.

16. The method as recited in Claim 15, wherein determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

- 5 comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and
 comparing the correlation value with a correlation threshold value.

17. The method as recited in Claim 15, further comprising:
determining whether the respective ones of the plurality of symbol positions
contain fixed symbols based on the average values determined for the respective ones
of the plurality of symbol positions; and
5 determining whether the received signal contains fixed symbols corresponding
to the predefined symbol sequence.

18. The method as recited in Claim 17, wherein determining whether the
respective ones of the plurality of symbol positions contain fixed symbols based on
the average values determined for the respective ones of the plurality of symbol
positions comprises:

5 comparing the average values determined for the respective ones of the
plurality of symbol positions with a symbol threshold value.

19. The method as recited in Claim 17, wherein determining whether the
received signal contains fixed symbols corresponding to the predefined symbol
sequence comprises:

comparing the average values determined for the fixed symbols with the
5 predefined symbol sequence to provide a correlation value; and
comparing the correlation value with a correlation threshold value.

20. The method as recited in Claim 15, wherein plurality of time slot
intervals is N time slot intervals, wherein N is not greater than three.

21. A method of processing a received signal, which comprises a desired
signal and an interference signal, across a plurality of time slot intervals, respective
ones of the plurality of time slot intervals having a plurality of symbol positions
associated therewith to provide a sequence of symbols associated with the received
5 signal, the method comprising:

determining an average value across the plurality of time slot intervals for a
respective one of the plurality of symbol positions; and

determining whether the received signal contains a symbol corresponding to a symbol associated with the interference signal based on the average value determined
10 for the respective one of the plurality of symbol positions.

22. The method as recited in Claim 21, wherein determining an average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

determining average values across the plurality of time slot intervals for
5 respective ones of the plurality of symbol positions; and

wherein determining whether the received signal contains a symbol corresponding to the symbol associated with the interference signal based on the average value determined for the respective one of the plurality of symbol positions comprises:

10 determining whether the received signal contains symbols corresponding to a symbol sequence associated with the interference signal based on the average values determined for respective ones of the plurality of symbol positions.

23. The method as recited in Claim 22, further comprising:

processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

24. The method as recited in Claim 23, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

5 determining whether to demodulate the received signal using joint demodulation based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

25. The method as recited in Claim 24, wherein a ratio of a power of the desired signal to a power of the interference signal is in a range of about 10 dB to about 25 dB.

26. The method as recited in Claim 24, wherein the received signal further comprises a noise signal, and wherein a ratio of a power of the desired signal to a power of the noise signal is in a range of about 23 dB to about 33 dB.

27. The method as recited in Claim 23, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

- 5 estimating a channel associated with the interference signal based on the symbol sequence associated with the interference signal if the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

28. The method as recited in Claim 27, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

- 5 estimating a timing delay between the desired signal and the interference signal based on the symbol sequence associated with the interference signal if the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

29. The method as recited in Claim 22, further comprising:
determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions; and

- 5 determining whether the received signal contains fixed symbols corresponding to the symbol sequence associated with the interference signal.

30. The method as recited in Claim 29, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions comprises:

- 5 comparing the average values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

31. The method as recited in Claim 29, wherein determining whether the received signal contains fixed symbols corresponding to the symbol sequence associated with the interference signal comprises:

- comparing the average values determined for the fixed symbols with the
5 symbol sequence associated with the interference signal to provide a correlation value;
and
comparing the correlation value with a correlation threshold value.

32. The method as recited in Claim 22, wherein the symbol sequence associated with the interference signal is a predefined symbol sequence.

33. A communication apparatus, comprising:

- a fixed information detection unit that is responsive to a received sequence of symbols associated with a signal received across a plurality of time slot intervals, the fixed information detection unit comprising:
5 an averaging unit that generates an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions responsive to the received signal; and
a fixed symbol estimation unit that generates a fixed symbol control signal that identifies whether the respective one of the plurality of symbol positions contains a
10 fixed symbol responsive to the average value generated for the respective one of the plurality of symbol positions.

34. The communication apparatus as recited in Claim 33, wherein the averaging unit generates average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions responsive to the received signal, and wherein the fixed symbol estimation unit generates the fixed symbol control
5 signal that identifies whether respective ones of the plurality of symbol positions contain fixed symbols responsive to the average values generated for the respective

ones of the plurality of symbol positions, the communication apparatus further comprising:

- 10 a known information detection unit that generates an output signal indicative of whether the received signal contains fixed symbols corresponding to a predefined symbol sequence responsive to the fixed symbol control signal and the average values generated for the identified respective ones of the plurality of symbol positions

35. The communication apparatus as recited in Claim 34, further comprising:

- 5 a demodulation unit that generates the received sequence of symbols responsive to the received signal and the output signal from the known information detection unit.

36. The communication apparatus as recited in Claim 35, wherein the demodulation unit is a joint demodulation unit, the received signal comprises a desired signal and an interfering signal, and the received sequence of symbols are associated with the interfering signal.

37. The communication apparatus as recited in Claim 36, wherein the joint demodulation unit is an adaptive joint demodulation unit.

38. The communication apparatus as recited in Claim 37, further comprising a control unit that generates a mode control signal responsive to the output signal from the known information detection unit, the adaptive joint demodulation unit being responsive to the mode control signal to place the adaptive joint demodulation unit into one of a joint demodulation mode and a single user demodulation mode.

39. The communication apparatus as recited in Claim 33, wherein the received signal is a communication signal received over a wireless communication network and the communication apparatus is one of a mobile terminal and a base transceiver station.

40. A communication apparatus, comprising:

a fixed information detection unit that is responsive to a received sequence of symbols associated with a signal received across a plurality of time slot intervals, the fixed information detection unit comprising:

5 an averaging unit that generates average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions responsive to the received signal; and

a known information detection unit that generates an output signal indicative of whether the received signal contains fixed symbols corresponding to a predefined
10 symbol sequence responsive to the average values generated for the respective ones of the plurality of symbol positions.

41. The communication apparatus as recited in Claim 40, further comprising:

a demodulation unit that generates the received sequence of symbols responsive to the received signal and the output signal from the known information
5 detection unit.

42. The communication apparatus as recited in Claim 41, wherein the demodulation unit is a joint demodulation unit, the received signal comprises a desired signal and an interfering signal, and the received sequence of symbols are associated with the interfering signal.

43. The communication apparatus as recited in Claim 42, wherein the joint demodulation unit is an adaptive joint demodulation unit.

44. The communication apparatus as recited in Claim 43, further comprising a control unit that generates a mode control signal responsive to the output signal from the known information detection unit, the adaptive joint demodulation unit being responsive to the mode control signal to place the adaptive joint
5 demodulation unit into one of a joint demodulation mode and a single user demodulation mode.

45. The communication apparatus as recited in Claim 40, wherein the received signal is a communication signal received over a wireless communication network and the communication apparatus is one of a mobile terminal and a base transceiver station.

46. A communication apparatus, comprising:

means for receiving a signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received
5 signal in respective ones of the plurality of symbol positions;

means for determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

means for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the
10 respective one of the plurality of symbol positions.

47. The communication apparatus as recited in Claim 46, wherein the means for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5 means for comparing the average value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

48. A communication apparatus, comprising:

means for receiving a signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received
5 signal in respective ones of the plurality of symbol positions;

means for determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

means for determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the average values
10 determined for the respective ones of the plurality of symbol positions.

49. The communication apparatus as recited in Claim 48, wherein the means for determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

5 means for comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and

means for comparing the correlation value with a correlation threshold value.

50. A computer program product for processing a received signal, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

5 computer readable program code for receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in respective ones of the plurality of symbol positions;

10 computer readable program code for determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

15 computer readable program code for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions.

51. The computer program product as recited in Claim 50, wherein the computer readable program code for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5 computer readable program code for comparing the average value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

52. A computer program product for processing a received signal, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

5 computer readable program code for receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in respective ones of the plurality of symbol positions;

10 computer readable program code for determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

computer readable program code for determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the
15 average values determined for the respective ones of the plurality of symbol positions.

53. The computer program product as recited in Claim 52, wherein the computer readable program code for determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

5 computer readable program code for comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and

computer readable program code for comparing the correlation value with a correlation threshold value.